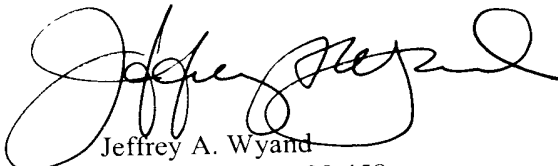


REMARKS

The foregoing Amendment corrects translational errors and conforms the claims to United States practice. No new matter is added.

Respectfully submitted,

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Date: January 10, 2002

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

YASUDA et al.

Art Unit: Unassigned

Application No. Unassigned

Examiner: Unassigned

Filed: January 10, 2002

For: SENSOR ELEMENT AND METHOD
OF FABRICATING THEREOF

**AMENDMENTS TO SPECIFICATION, CLAIMS AND
ABSTRACT MADE VIA PRELIMINARY AMENDMENT**

Amendments to the paragraph beginning at page 1, line 4:

The present invention relates to a sensor element, particularly to a sensor such as a magnetoresistance sensor, an air flow sensor, an acceleration sensor, a pressure sensor, a yaw rate sensor, an image sensor, or the like, having a ~~predetermined extent of~~ sensor face.

Amendments to the paragraph beginning at page 1, line 10:

As a sensor element for controlling the running of vehicles, there have been used an acceleration sensor, a yaw rate sensor, a pressure sensor, an air flow sensor, a magnetoresistance sensor or the like. Among them, the air flow sensor for detecting a flow rate of gasoline is in such a constitution that, for example, temperature variation at the sensing portion in which resistance wiring is embedded caused by contacting ~~to~~ the flow path of gasoline-containing gas is detected by the change of resistance of the resistance wiring whereby the flow rate of the gasoline-containing gas can be detected. The sensing portion is formed on a lower supporting film comprising an inorganic material such as a silicon nitride film supporting the sensing portion. The inorganic material is usually formed ~~by~~ in a sputtering process, a CVD process, or a vapor deposition process and, therefore, film quality such as ~~a~~ microscopic surface roughness and a film composition delicately changes depending upon apparatus and ~~condition~~ conditions for the formation of film. Due to the changes in the film quality as such, there are noted dispersion of several % in sensor characteristic (such as sensitivity) whereby it has been difficult to achieve a stable sensor characteristic with ~~a~~ good reproducibility. There are other problems that, due to the stress difference between the sensing portion and the inorganic material, the sensor characteristic is

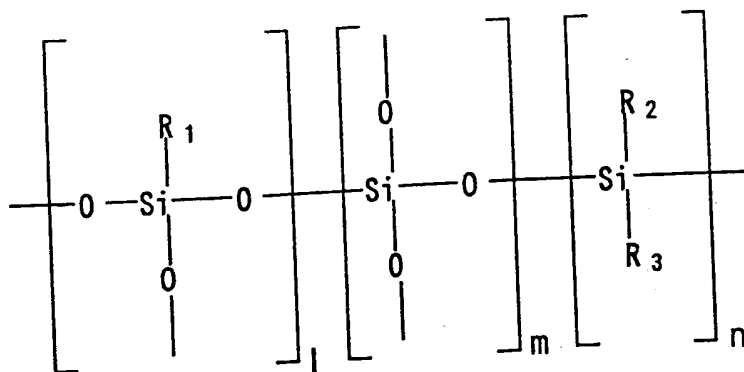
deteriorated or a positional shift is caused in the resistance wiring constituting the sensing portion or a wiring on a contiguous control circuit. Particularly, in the case of a sensor in which ~~the~~ wiring, such as ~~a~~ resistance wiring, is used for the sensing portion, depending on the ~~constituting~~ materials used for the wiring, adherence with a matrix material is significantly weak, ~~for example, when~~. When the sensor element is sealed by a resin, there poses a problem that ~~such a~~ the wiring is liable to ~~cause the~~ experience a positional shift ~~by~~ due to thermal or mechanical strain.

Amendments to the paragraph beginning at page 5, line 9:

Figs. 3A- and 3B are ~~a~~ drawings which ~~illustrates~~ illustrate the structure of the air flow sensor of Example 1 according to the present invention where Fig. 3A is a ~~plane plan~~ view and Fig. 3B is a cross-sectional view along the line ~~A-A~~ IIIB-IIIB of Fig. 3A.

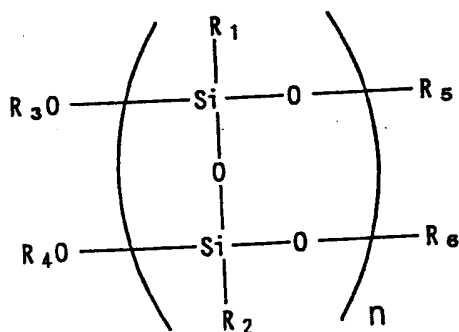
Amendments to existing claims:

1. (Amended) A sensor element comprising:
sensor substrate; ~~and~~
a sensing portion supported by the sensor substrate; and
~~wherein a resin film is provided~~ between the sensor substrate and the sensing portion.
3. (Amended) The sensor element according to claim 2, wherein the microfine wiring pattern comprises plural wiring patterns ~~being~~ adjacent each other.
4. (Amended) The sensor element according to claim 1, wherein the resin film is a cured ~~film of a curing~~ polymer film selected from ~~a the group consisting of~~ silicone-polymer polymers, a polyimide-polymer polymers, a polyimide silicone-polymer polymers, a polyarylene ether-polymer polymers, a bisbenzocyclobutene-polymer polymers, a polyquinoline, a perfluorohydrocarbon, a fluorocarbon-polymer polymers, and an aromatic hydrocarbon-polymer polymers.
5. (Amended) The sensor element according to claim 4, wherein the ~~curing~~ polymer is a photo-curing polymer.
6. (Amended) The sensor element according to claim 1, wherein the ~~resin film is a~~ cured polymer film of the is a silicone polymer represented by the general formula (1);



wherein R_1 , R_2 , and R_3 , ~~which~~ may be the same or different, ~~each is~~ are selected from the group consisting of an aryl group, a hydrogen atom, an aliphatic alkyl group, a hydroxyl group, a trialkylsilyl group ~~or~~, and a functional group having an unsaturated bond; ~~and~~, 1, m, and n are integers and at least 0, ~~and the silicone polymer~~ has a weight-average molecular weight of not less than 1,000.

7. (Amended) The sensor element according to claim 1, wherein the resin film is a cured film of ~~the~~ a silicone polymer represented by the general formula ~~(2)~~:



wherein R_1 and R_2 , ~~which~~ may be same or different, ~~each is~~ and are selected from the group consisting of an aryl group, a hydrogen atom, an aliphatic alkyl group ~~or~~, and a functional group having an unsaturated bond; R_3 , R_4 , R_5 , and R_6 , ~~which~~ may be same or different, ~~each is~~ and are selected from the group consisting of a hydrogen atom, an aryl group, an aliphatic alkyl group, a trialkylsilyl group ~~or~~, and a functional group having an unsaturated bond; and n is an integer; ~~and the silicone polymer~~ has a weight-average molecular weight of not less than 1,000.

8. (Amended) The sensor element according to claim 4, wherein the resin film comprises ~~layered film comprising~~ plural layers and each of the layers comprises a cured polymer film of a different curing cured polymer.

9. (Amended) The sensor element according to claim 8, wherein each of the ~~layered film~~ layers comprises a cured ~~film of curing~~ polymer having different molecular weight.

10. (Amended) The sensor element according to claim 9, wherein the ~~layered film is composed of~~ layers include a layer of a cured polymer film comprising a silicone polymer having a weight-average molecular weight of not less than 100,000 and a layer of a cured polymer film comprising a silicone polymer having a weight-average molecular weight of not more than 100,000.

11. (Amended) The sensor element according to claim 8, wherein ~~the~~ an uppermost layer of the ~~layered film comprising plural~~ layers comprises a cured polymer film of a photocuring polymer.

12. (Amended) The sensor element according to claim 1, wherein the sensor element is selected from the group consisting of a magnetoresistance sensor, an air flow sensor, an acceleration sensor, a pressure sensor, a yaw rate sensor ~~or, and~~ and an image sensor.

13. (Amended) A method of fabricating a sensor element, comprising ~~a step of coating:~~
applying a solution of including a thermosetting polymer on to a sensor substrate to form a curing polymer film, a step of;
heating the curing polymer film at temperatures which are to a temperature not lower than a fusing temperature and are lower than a curing temperature of the thermosetting polymer, a step of;
heating thereof at the polymer film to a temperature of not lower than the curing temperature to form a cured cure the resin film; and a step of
forming a desired sensing portion sensor element on the cured resin film after curing of the resin film.

14. (Amended) The method of fabricating a sensor element according to claim 13, wherein the thermosetting polymer is selected from the group consisting of a silicone polymer, a polyimide polymer, a polyimide silicone polymer, a polyarylene ether polymer, a bisbenzocyclobutene polymer, a polyquinoline polymer, a perfluorohydrocarbon polymer, a fluorocarbon polymer ~~or, and~~ and an aromatic hydrocarbon polymer.

Amendments to the abstract:

Abstract

The present invention provides a sensor element having a sensor substrate and a sensing portion supported by the sensor substrate ~~in which a~~. A resin film is provided between the sensor substrate and the sensing portion. The resin film has a high heat resistance to the temperature ~~at of the~~ fabrication process and ~~for~~ the use of sensor element, ~~has an excellent coverage performance of an undercoat having~~ a three-dimensional structure, ~~can be made its~~ has a flat surface flat, has applies a low stress ~~applied~~ to the sensing portion, ~~can be~~ is formed at low temperature, and ~~can prevent~~ prevents the sensing portion from being adversely affected in ~~the~~ its fabrication process.